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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/540,980	08/09/2006	Shinichi Terada	2691-000022/US	9530

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EXAMINER
KAO, CHIH CHENG G

ART UNIT	PAPER NUMBER
2882	

MAIL DATE	DELIVERY MODE
12/18/2008	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/540,980	TERADA, SHINICHI	
	Examiner	Art Unit	
	Chih-Cheng Glen Kao	2882	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *17 November 2008*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *9-16* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *9-11 and 13-15* is/are rejected.

7)☒ Claim(s) *12 and 16* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *27 June 2005* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on November 17, 2008, has been entered.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

2. Claims 9 and 13 are rejected under 35 U.S.C. 102(e) as being anticipated by Koppel et al. (US 6507634).

3. Regarding claim 9, Koppel et al. discloses a method comprising: irradiating the insulator film (col. 3, lines 25-27; SiO_2 film) with X-rays (fig. 1, from #100) from the insulator film's surface side at an incident angle which is set to be larger than a total-reflection critical angle of

the insulator film (fig. 3, #306) and larger than 1.0 times a total-reflection critical angle of a substrate (fig. 3, #308) but less than 1.3 times a total-reflection critical angle of the substrate (fig. 3, #308); and necessarily detecting (fig. 1, with #108) among reflection components reflected on the surface of the substrate (fig. 3, silicon wafer on stage #104 of fig. 1) of the X-rays which have entered the insulator film (col. 3, lines 25-27; SiO_2 film), reflection components exiting from the insulator film after entering the pore or particle (which are necessarily in the sample) and scattering (fig. 1, to the detector #108), having an exit angle larger than that of reflection components which exit from the insulator film without entering the pore or particle.

4. Regarding claim 13, Koppel et al. further discloses wherein the X-rays are generated by an X-ray generating source (fig. 1, #100) and the generated X-rays are converged (fig. 1, via #102) and made incident onto the measurement target object (fig. 1, #106) at the incident angle, and wherein the X-rays coming from the measurement target object are detected by a position-sensitive X-ray detector (fig. 1, #108).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Koppel et al. as applied to claim 9 above, and further in view of Houtman (US 5446777).

Koppel et al. discloses a method as recited above.

However, Koppel et al. fails to disclose wherein the X-rays are generated by a line focus X-ray tube, and a parallel light flux, of the generated X-rays, composed of mutually-parallel components of a specific direction lying in a specific wavelength band is selected to enter the measurement target object at the incident angle, and wherein only a specific-direction component of the X-rays coming from the measurement target object is allowed to pass through a slit, and the X-rays having passed through the slit is detected by a position-sensitive X-ray detector.

Houtman teaches wherein X-rays are generated by a line focus X-ray tube (fig. 1, #10), and a parallel light flux, of the generated X-rays, composed of mutually-parallel components of a specific direction lying in a specific wavelength band is selected (fig. 1, via #2) to enter a measurement target object (fig. 2, #20) at an incident angle, and wherein only a specific-direction component of the X-rays coming from the measurement target object is allowed to pass through a slit (fig. 2, #6), and the X-rays having passed through the slit is detected by a position-sensitive X-ray detector (fig. 2, #28).

It would have been obvious, to one having ordinary skill in the art at the time the invention was made, to modify the method of Koppel et al. with the teachings of Houtman, since one would have been motivated to make such a modification for higher spatial resolutions (fig. 1, lines 18-21).

6. Claim 11 is rejected under 35 U.S.C. 103(a) as being unpatentable over Koppel et al. as applied to claim 9 above, and further in view of Mazor et al. (US 6556652).

Koppel et al. discloses a method as recited above.

However, Koppel et al. fails to disclose wherein the X-rays are generated by a point focus X-ray tube, and an X-ray beam, of the generated X-rays, composed of specific-direction components which are mutually parallel and exist in a specific wavelength band is selected to enter the measurement target object at the incident angle, and wherein the X-rays coming from the measurement target object are detected by a position-sensitive X-ray detector.

Mazor et al. teaches wherein X-rays are generated by a point focus X-ray tube (fig. 3, #40), and an X-ray beam, of the generated X-rays, composed of specific-direction components which are mutually parallel (fig. 6, #36) and exist in a specific wavelength band is selected (fig. 3, via #42) to enter a measurement target object (fig. 3, on #38) at an incident angle, and wherein the X-rays coming from the measurement target object are detected by a position-sensitive X-ray detector (fig. 3, #44).

It would have been obvious, to one having ordinary skill in the art at the time the invention was made, to modify the method of Koppel et al. with the teachings of Mazor et al., since one would have been motivated to make such a modification for increasing spatial resolution to measure additional things (col. 2, lines 15-23) as implied from Mazor et al.

7. Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over Koppel et al. as applied to claim 13 above, and further in view of Yokhin (US 2002/0150209).

Koppel discloses a method as recited above.

However, Koppel et al. fails to disclose wherein an area of incident of the X-rays on the measurement target object is regulated by an X-ray irradiation range regulatory plate that is arranged immediately above a position of incidence at a predetermined spacing.

Yokhin teaches wherein an area of incident of X-rays (fig. 1, #27) on a measurement target object (fig. 1, on #24) is regulated by an X-ray irradiation range regulatory plate (fig. 1, #36) that is arranged immediately above a position of incidence at a predetermined spacing.

It would have been obvious, to one having ordinary skill in the art at the time the invention was made, to modify the method of Koppel et al. with the regulatory plate of Yokhin, since one would have been motivated to make such a modification for optimizing detection (paragraph 57) as shown by Yokhin.

8. Claim 15 is rejected under 35 U.S.C. 103(a) as being unpatentable over Koppel et al. in view of Koppel. (US 5619548).

Koppel et al. discloses a method comprising the steps of irradiating X-rays generated by a focus X-ray source (fig. 1, #100) from the insulator film's surface side at an incident angle set to be larger than a total-reflection critical angle of an uppermost surface layer (figs. 2 and 3), and detecting scattered X-rays by a two-dimensional position-sensitive detector (fig. 1, #108).

However, Koppel et al. fails to disclose a point source X-ray source.

Koppel teaches a point source X-ray source (fig. 4, #31).

It would have been obvious, to one having ordinary skill in the art at the time the invention was made, to modify the method of Koppel et al. with the source of Koppel, since one would have been motivated to make such a modification for decreasing the amount of time to measure a structure (col. 2, lines 30-35) as implied from Koppel.

Furthermore, since the Examiner finds that the prior art contained a method (i.e., Koppel et al.) which differed from the claimed method by the substitution of one source for another, and

since the Examiner finds that the substituted sources and their functions were known in the art, the Examiner thus finds that one of ordinary skill in the art could have substituted one known source for another, and the results of the substitution would have been predictable. Therefore, such a claimed combination would have been obvious.

Allowable Subject Matter

9. Claims 12 and 16 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten to overcome the respective claim objection(s) set forth in the Office action and if rewritten in independent form including all of the limitations of the base claim and any intervening claims. The following is a statement of reasons for the indication of allowable subject matter.

10. Regarding claim 12, the prior art fails to disclose or fairly suggest a pore or particle-size measurement method for measuring size distribution of pores or particles existing within a porous insulator film formed on a surface of a substrate, including wherein a specific specular reflection component is prevented from entering a detection surface of the position-sensitive X-ray detector by an X-ray blocking plate, the specular reflection component being derived from the X-rays which are reflected from the surface of the substrate after having entered the insulator film and exited from the insulator film without entering the pore or particle, in combination with all of the other limitations in the claim.

11. Regarding claim 16, the prior art fails to disclose or fairly suggest a pore or particle-size measurement method for measuring size distribution of pores or particles existing within a porous insulator film formed on a surface of a substrate, including wherein a specific specular reflection component is prevented from entering a detection surface of the position-sensitive X-ray detector by an X-ray blocking plate, the specular reflection component being derived from the X-rays which are reflected from the surface of the substrate after having entered the insulator film and exited from the insulator film without entering the pore or particle, in combination with all of the other limitations in the claim.

Response to Arguments

12. Applicant's arguments with respect to claims 9-11 and 13-15 have been considered but are moot in view of the new ground(s) of rejection. Applicant's arguments filed November 17, 2008, have been fully considered but they are not persuasive.

Regarding at least claims 9 and 15, Applicant argues that Koppel et al. fails to disclose irradiating the insulator film with X-rays from the insulator film's surface side at an incident angle which is set to be larger than a total-reflection critical angle of the insulator or an uppermost surface layer and larger than 1.0 times a total-reflection critical angle of the substrate, but less than 1.3 times a total-reflection critical angle of the substrate. The Examiner disagrees. As seen in Figure 3, Koppel et al. shows two critical angles 306 and 308, which correspond to the critical angle of the insulator (fig. 3, #306) and the critical angle of the substrate (fig. 3, #308). As seen in Figure 3, the reflection angle increases as the incident angle is changed (fig. 4, #406; and col. 4, lines 7-25) as further explained by Koppel et al. Since the angle of incidence

goes through a range of angles, as evidenced by the graph in Figure 3, Koppel et al. will necessarily irradiate the insulator film with X-rays from the insulator film's surface side at an incident angle which is set to be larger than a total-reflection critical angle of the insulator and larger than 1.0 times a total-reflection critical angle of the substrate, but less than 1.3 times a total-reflection critical angle of the substrate, at some point in that graph of Figure 3. Therefore, Koppel et al. necessarily discloses that portion of the claim.

In conclusion, Applicant's arguments are not persuasive, and the respective claims remain rejected.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Chih-Cheng Glen Kao whose telephone number is (571)272-2492. The examiner can normally be reached on M - F (9 am to 5 pm).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ed Glick can be reached on (571) 272-2490. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Chih-Cheng Glen Kao/
Primary Examiner, Art Unit 2882